Claims

[c1] 1. A data transfer device comprising:
a transmitting block,
a receiving block, and
a plurality of signal lines;
wherein data is transferred from said transmitting block through said plurality of signal lines to said receiving block,
said transmitting block includes:
a determination unit for dividing said signal lines into a plurality of groups and determining either inversion or non-inversion of data to be transferred regarding data transferred through said signal lines of each group;
an inversion unit for inverting the data to be transferred for the group determined to be subjected to data inversion by the determination unit; and
a transmission unit for transmitting the data through said signal lines, and
said receiving block includes:
a receiving unit for receiving the data transferred through said signal lines; and
a decoding unit for returning, among the data received by the receiving unit, the data of the group having been subjected to the data inversion by the inversion unit to an original state.

[c2] 2. The data transfer device according to claim 1, wherein said transmitting block further includes an inversion signal output unit for outputting a signal indicating completed inversion in synchronization with data of the group, regarding the group having been subjected to the inversion by the inversion unit.

[c3] 3. The data transfer device according to claim 1,
wherein the determination unit counts the number of data to be transferred, which is different from data transferred immediately therebefore for each group, and
the determination unit selects a combination of either inversion or non-inversion for each group based on a result of the counting in order to minimize a sum total of changes of data for all the groups.

[c4] 4. A display device comprising:
a plurality of drivers for driving a display panel;

a controller for controlling said drivers; and

a predetermined number of signal lines wired between said drivers and said controller,

wherein said controller includes:

a determination unit for determining whether inversion should be performed or not for each group, regarding digital signals to be transferred through said signal lines divided into a plurality of groups;

an inversion unit for inverting the digital signals to be transferred for the group determined to be inverted by the determination unit; and

a transmission unit for transmitting the digital signals to said signal lines, and

each of said drivers includes:

a receiving unit for receiving the digital signals transferred through said signal lines; and

a decoding unit for returning, among the digital signals received by the receiving unit, a digital signal of the group having been subjected to digital signal inversion by the inversion unit to the original signal.

[c5] 5. A data transmitter for transmitting data of predetermined bits, comprising:

a counting circuit for dividing data into a plurality of groups, and counting the number of data to be changed in the course from data to be transmitted to data transmitted immediately therebefore for each group;

a selection circuit for selecting either inversion or non-inversion for the data to be transmitted for each group; and

an inversion circuit for inverting the data to be transmitted for the group, of which the data is determined to be inverted by said selection circuit.

[c6] 6. The data transmitter according to claim 5, wherein said selection circuit selects either inversion or non-inversion of the data to be transmitted for each group, based on whether the number of data to be changed counted for each group by the counting circuit is in a predetermined range or not.

[c7] 7. The data transmitter according to claim 6, wherein in said selection circuit, the range is set to include less than n/2 regarding n-bit data transmitted for each group.

[c8] 8. The data transmitter according to claim 6, wherein, when the numbers of data to be changed are in the predetermined range for all the groups, said selection circuit selects either inversion or non-inversion of each group in order to reduce a sum total of changes of data of all the groups.

[c9] 9 The data transmitter according to claim 6, wherein, when the numbers of data to be changed are out of the predetermined range for all the groups, said selection circuit selects inversion of data regarding a group having the number of data to be changed exceeding the predetermined range, and selects non-inversion of data regarding a group having the number of data to be changed below the predetermined range.

[c10] 10. The data transmitter according to claim 6, wherein, when the number of data to be changed, which is a value obtained by adding up the number of data to be changed in one direction and the number of data to be changed in an opposite direction, is out of the predetermined range for at least one group, said selection circuit selects inversion of data if the number of data to be changed exceeds the predetermined range regarding the group out of the range, and non-inversion of data if the number of data to be changed is below the predetermined range, and then regarding the other group having the number of data to be changed in the predetermined range, said selection circuit compares the case of data inversion with the case of data non-inversion, and selects the case having data of a lower amount of changes, which is a value obtained by subtracting the numbers of data to be changed in one and opposite directions from each other.

[c11] 11. A data receiver comprising:
a receiving unit for receiving data of predetermined number of bits transferred after having been divided into a plurality of groups;
an inversion bit determination unit for determining affixment of an inversion bit to the data received by said receiving unit for each group; and
a decoding unit for inverting the data received by said receiving unit for the group determined to have the affixment of the inversion bit by said inversion bit determination unit.

[c12] 12. A data transfer method comprising the steps of:

dividing of data of a predetermined number of bits to be transferred into a plurality of groups;
deciding either inversion or non-inversion for each group in order to reduce electromagnetic interference;
inverting data to be transferred for a group determined to be subjected to inversion;
transferring the data; and
presetting either inversion or non-inversion of data to be transferred for each group regarding a first data to be transferred before starting said data transfer.

[c13] 13. A data transfer method comprising the steps of:
dividing data of a predetermined number of bits to be transferred into a plurality of groups and transmitting data to be transferred for each group after either inversion or non-inversion thereof in order to minimize a sum total of changes of data of all the groups at a data transmission side; and
inverting received data for the group having been subjected to data inversion at a data receiving side.

[c14] 14. The data transfer method according to claim 13, further comprising the steps of:
examining combinations of two states of data inversion and non-inversion for each group; and
selecting a combination having the smallest number of data to be changed, when a result of said examining step shows that there are a plurality of combinations for minimizing a sum total of changes of data of all the groups.

[c15] 15. The data transfer method according to claim 13, comprising the steps of:
counting for each group a number of data where the change in the course from the data transmitted immediately before to the data to be transmitted is high to low (CountH2L), a number of data where the change in the course from the data transmitted immediately before to the data to be transmitted is low to high (CountL2H), a number of data subjected to inversion where the change in the course from the data transmitted immediately before to the data to be transmitted is high to low (iCountH2L) and a number of data subjected to inversion where the

change in the course from the data transmitted immediately before to the data to be transmitted is low to high (iCountL2H);

calculating data variation (DiffCount = CountH2L CountL2H) for each group and data variation (iDiffCount = iCountH2L iCountL2H) for each group in the case of inversion; and

selecting a combination for minimizing a sum total of changes of data of all the groups, based on the data variation (DiffCount) and the data variation (iDiffCount) for each said group.